

Date: Monday, 02/02/2009 10:07:46 AM
 User: Julie Dawson

Process Sheet

| | |
|---|--|
| Customer : CU-DAR001 Dart Helicopters Services | Drawing Name : X-TUBE AS 350/355 HI FWD |
| Job Number : 45380 | |
| Estimate Number : 13224 | |
| P.O. Number : | Part Number : D350748141TRN |
| This Issue : 02/02/2009 S.O. No. : | Drawing Number : D350-748-141 REV D |
| Prsht Rev. : NC | Project Number : N/A |
| First Issue : / / Type : CROSSTUBES | Drawing Revision : D |
| Previous Run : 45367 | Material : |
| Written By : | Due Date : 05/02/2009 Qty: 1 Um: Each |
| Checked & Approved By : <u>Julie Dawson</u> | |
| Comment : Est Rev A New Issue 08-03-06 DD verified by:ec Est Rev B Removed polish 08.04.02 EC verified by : DD Est Rev C Remove LPS-3 08.06.23 EC verified by DD | |

Additional Product

Job Number:



| | | |
|----------------|------------------------------|----------------------|
| Seq. #: | Machine Or Operation: | Description : |
|----------------|------------------------------|----------------------|

1.0

D6017115

Crosstube Material



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Crosstube Material

D6017-115

2.339" OD X 2.000" ID

Patch B-2972

A.M. 09.02.03 ①

2.0

MORI SEIKI

MORI SEIKI CNC LATHE LARGE



Comment: MORI SEIKI CNC LATHE LARGE

1-Fill tube with sand & install plugs on both ends as per Folio FA648

2-Turn first side as per Folio FA648

3- File transition lines smooth.

A.M. 09.02.03 ①

3.0

QC1

INSPECT ALL DIM TO DIM SHEET



Comment: INSPECT ALL DIM TO DIM SHEET

A.M. 09.02.03 ①

4.0

MORI SEIKI

MORI SEIKI CNC LATHE LARGE



Comment: MORI SEIKI CNC LATHE LARGE

1-Turn second side as per Folio FA648

2- File transition lines smooth.

A.M. 09.02.03 ①

| W/O: | | WORK ORDER CHANGES | | | | | |
|------|------|--------------------|----|------|-----|-------------------------------------|--------------------------|
| DATE | STEP | PROCEDURE CHANGE | By | Date | Qty | Approval Chief Eng / Prod Mgr | Approval QC Inspector |
| | | | | | | | |
| | | | | | | | |

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

| NCR: | | WORK ORDER NON-CONFORMANCE (NCR) | | | | | | |
|------|------|----------------------------------|--------------------------------|---------------------------------|----------------|---------------------------|-----------------------|--------------------------|
| DATE | STEP | Description of NC Section A | Corrective Action Section B | | | Verification Section C | Approval Chief Eng | Approval QC Inspector |
| | | | Initial Chief Eng | Action Description Chief Eng | Sign & Date | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

NOTE: Date & initial all entries

Date: Monday, 02/02/2009 10:07:46 AM
User: Julie Dawson

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE AS 350/355 HI FWD

Job Number: 45380

Part Number: D350748141TRN

Job Number:



Seq. #:

Machine Or Operation:

Description :

3-Scribe Part & Batch as per Dwg D350-748-141

Q m 09.02.03 ①

5.0

QC1

INSPECT ALL DIM TO DIM SHEET



Comment: INSPECT ALL DIM TO DIM SHEET

Q m 09.02.03 ①

6.0

QC8

SECOND CHECK



Comment: SECOND CHECK

AWM 9-2-5 ①

7.0

LARGE FAB 1

LARGE FABRICATION RESOURCE 1



Comment: LARGE FABRICATION RESOURCE 1

AWM 9-2-5 ①

Grind machining marks

8.0

OUTSIDE SERV.11

OUTSIDE SERVICE -CROSSTUBES



Comment: Sub-Contracting OUTSIDE SERVICES

Issue P/O: *8281*

Heat Treat to min 180 KSI As per Dwg D350-748-141

(MIL-T-6736 OR AMS 2759-1C)

Sand Blast tube after Heat Treat

Possible Supplier: Vac Aero

Ensure Certificate of Conformity is attached

09/02/26 ①

9.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Receive & Inspect For Transit Damage

Ensure certificate of conformaty is attached

09/3/23 ①

10.0

QC6

DIMENSIONAL CHECK



Comment: DIMENSIONAL CHECK

09/04/13 ①

11.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Identify and stock in kanban rack

Location: *skid-tube all*

MS 09-04-13 ①

| W/O: | | WORK ORDER CHANGES | | | | | |
|------|------|--------------------|----|------|-----|-------------------------------------|--------------------------|
| DATE | STEP | PROCEDURE CHANGE | By | Date | Qty | Approval Chief Eng / Prod Mgr | Approval QC Inspector |
| | | | | | | | |
| | | | | | | | |

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

| NCR: | | WORK ORDER NON-CONFORMANCE (NCR) | | | | | | |
|------|------|----------------------------------|-----------------------------|---------------------------------|----------------|---------------------------|-----------------------|--------------------------|
| DATE | STEP | Description of NC Section A | Corrective Action Section B | | | Verification Section C | Approval Chief Eng | Approval QC Inspector |
| | | | Initial Chief Eng | Action Description Chief Eng | Sign & Date | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

NOTE: Date & initial all entries

Date: Monday, 02/02/2009 10:07:46 AM
User: Julie Dawson

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE AS 350/355 HI FWD

Job Number: 45380

Part Number: D350748141TRN

Job Number:



Seq. #:

Machine Or Operation:

Description :

12.0

QC21

FINAL INSPECTION/W/O RELEASE



09/04/13 *[Signature]*

Comment: FINAL INSPECTION/W/O RELEASE

Job Completion



C209/04/13

| W/O: | | WORK ORDER CHANGES | | | | | |
|------|------|--------------------|----|------|-----|-------------------------------------|--------------------------|
| DATE | STEP | PROCEDURE CHANGE | By | Date | Qty | Approval Chief Eng / Prod Mgr | Approval QC Inspector |
| | | | | | | | |
| | | | | | | | |

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

| NCR: | | WORK ORDER NON-CONFORMANCE (NCR) | | | | | | |
|------|------|----------------------------------|-----------------------------|---------------------------------|----------------|---------------------------|-----------------------|--------------------------|
| DATE | STEP | Description of NC Section A | Corrective Action Section B | | | Verification Section C | Approval Chief Eng | Approval QC Inspector |
| | | | Initial Chief Eng | Action Description Chief Eng | Sign & Date | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

NOTE: Date & initial all entries

| | | |
|---|--|----------------------------------|
| DART AEROSPACE LTD | | Work Order: 45380 |
| Description: Crosstube Assembly (AS350/355 High Fwd) | | Part Number: D350-748-141 |
| Inspection Dwg: D350-748-141 Rev: D | | Page 1 of 1 |

FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article
 ☐ Prototype

| Inspection Sheet | Drawing Dimension | Tolerance | Actual Dimension | Accept | Reject | Method of Inspection | Comments |
|------------------|-------------------|---------------|------------------|--------|--------|----------------------|----------|
| SIDE A | 2.240 | +0.005/-0.000 | 2.245 | ✓ | | | |
| | 2.180 | +0.005/-0.000 | 2.185 | ✓ | | | |
| | 2.180 | +0.005/-0.000 | 2.185 | ✓ | | | |
| | 2.237 | +0.005/-0.000 | 2.242 | ✓ | | | |
| | 2.272 | +0.005/-0.000 | 2.277 | ✓ | | | |
| | 2.306 | +0.005/-0.000 | 2.311 | ✓ | | | |
| | 2.339 | +0.005/-0.000 | 2.339 | ✓ | | | |
| | 2.339 | +0.005/-0.000 | 2.339 | ✓ | | | |
| | 0.062 | +/-0.010 | 0.062 | ✓ | | | |
| | 4.26 | +/-0.030 | 4.270 | ✓ | | | |
| | R0.063 | +/-0.010 | R0.063 | ✓ | | | |
| | R0.50 | +/-0.030 | R0.50 | ✓ | | | |
| | | | | | | | |
| | | | | | | | |
| SIDE B | 2.240 | +0.005/-0.000 | 2.245 | ✓ | | | |
| | 2.180 | +0.005/-0.000 | 2.185 | ✓ | | | |
| | 2.180 | +0.005/-0.000 | 2.185 | ✓ | | | |
| | 2.237 | +0.005/-0.000 | 2.242 | ✓ | | | |
| | 2.272 | +0.005/-0.000 | 2.277 | ✓ | | | |
| | 2.306 | +0.005/-0.000 | 2.311 | ✓ | | | |
| | 2.339 | +0.005/-0.000 | 2.339 | ✓ | | | |
| | 2.339 | +0.005/-0.000 | 2.339 | ✓ | | | |
| | 0.062 | +/-0.010 | 0.062 | ✓ | | | |
| | 4.26 | +/-0.030 | 4.270 | ✓ | | | |
| | R0.063 | +/-0.010 | R0.063 | ✓ | | | |
| | R0.50 | +/-0.030 | R0.50 | ✓ | | | |
| | | | | | | | |
| | | | | | | | |
| | 110.27 | +/-0.060 | 110.300 | ✓ | | | |

| | | |
|-------------------------|------------------------|--------------------------------|
| Measured by: A.M | Audited by: AWM | Prototype Approval: N/A |
| Date: 09.02.03 | Date: 9-2-5 | Date: N/A |

| Rev | Date | Change | Revised by | Approved |
|-----|----------|------------------------------|------------|----------|
| A | 06.11.09 | New Issue (P/O D350-748-101) | KJ/JLM | |
| B | 07.10.24 | Dwg Rev updated | KJ/EC/DD | |

DART

| | | | |
|----------------------|-----------------------|--|------------------------|
| DESIGN <i>qp</i> | DRAWN BY <i>qp</i> | DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA | |
| CHECKED <i>HA</i> | APPROVED <i>HA</i> | DRAWING NO. D350-748-141 | REV. D SHEET 1 OF 3 |
| DATE 06.10.31 | | TITLE CROSSTUBE (AS 350/355 HI FWD) | SCALE NTS |
| A | 06.03.31 | NEW ISSUE | |
| B | 06.06.30 | ADD D6017-115 & PRIME AND PAINT | |
| C | 06.08.14 | ADD CAD PLATING | |
| D | 06.10.31 | MAG. PARTICLE AND CAD PLATE AS MFD. | |

RELEASED06.10.31 *HA*

| QTY | P/N | DESCRIPTION |
|-----|---------------|--|
| X | D350-748-141 | CROSSTUBE ASSEMBLY (AS 350/355 HI FWD) |
| 1 | D6017-115 | CROSSTUBE (OR D6015-125) |
| 2 | D3502-1 | SUPPORT |
| 2 | D2856-400-710 | ABRASION STRIP |
| 1 | AELS-1032-225 | INSERT |
| 1 | AN960JD10 | WASHER |
| 2 | MS21920-20 | CLAMP (PER DART SPEC. M-MS21920-20) |
| 1 | MS27039-1-10 | SCREW |

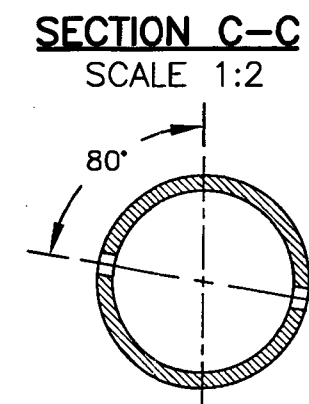
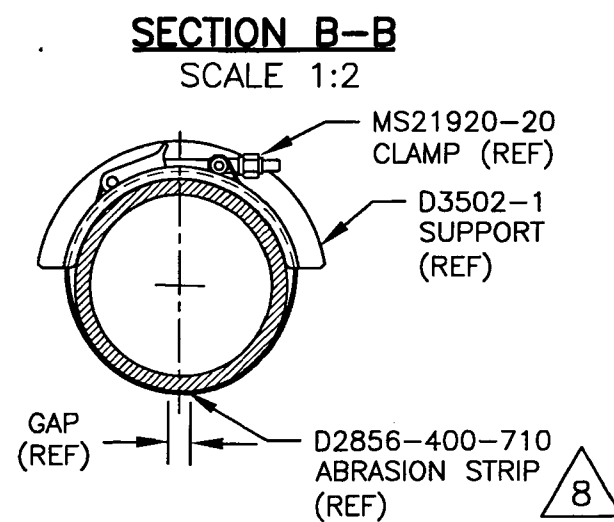
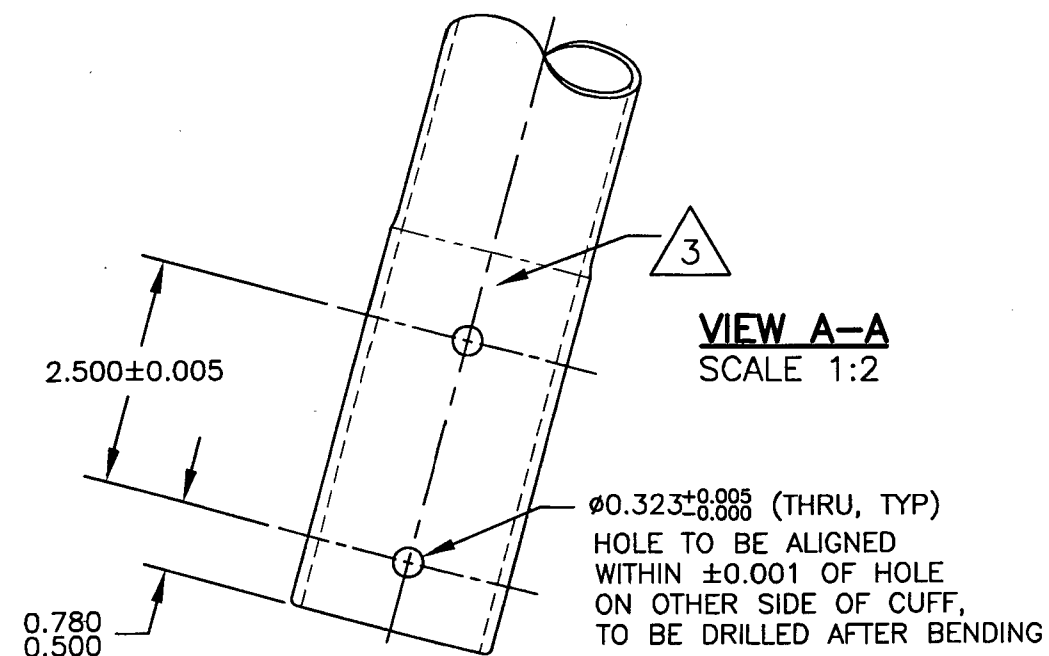
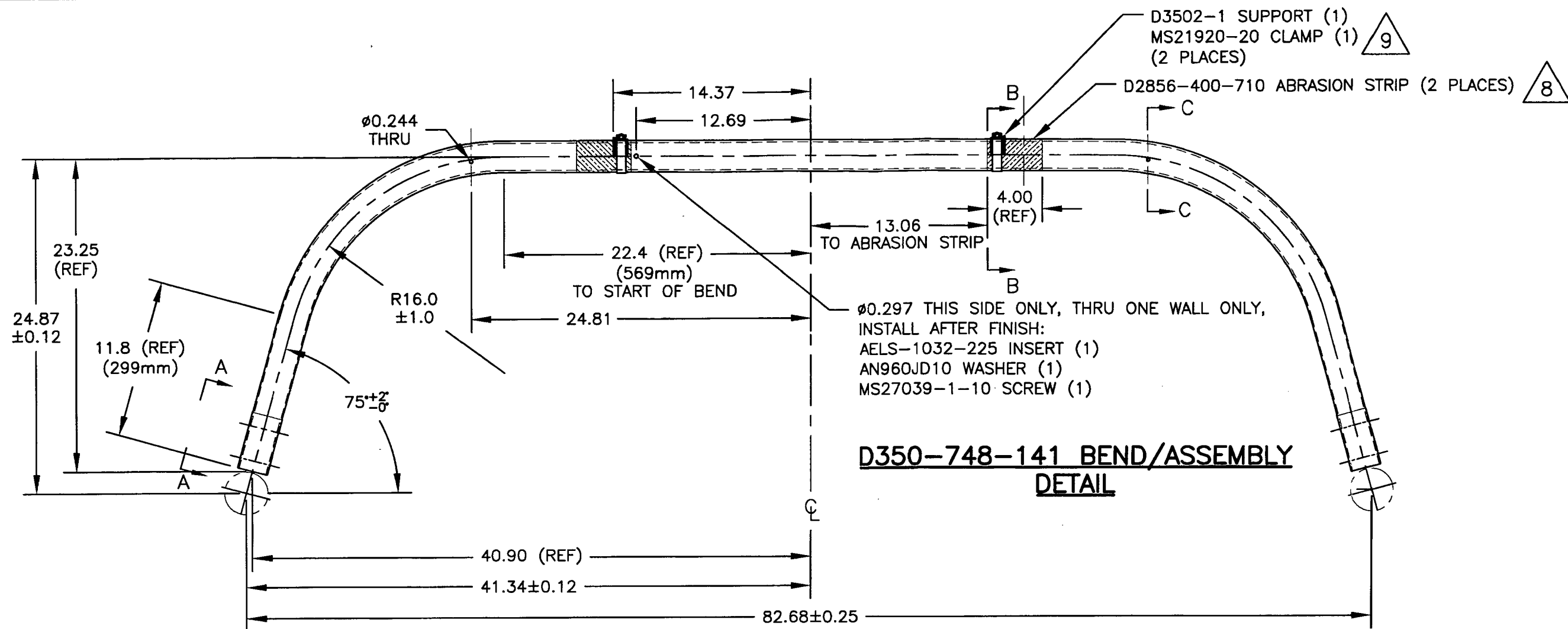
D350-748-141 CROSSTUBE:

- 1) MATERIAL: MANUFACTURED FROM D6017-115 OR D6015-125
FINISHED LENGTH = 110.27 ± 0.06
- 2) MACHINE PER MACHINING DETAIL ON PAGE 3. BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITIONS SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 3) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 4) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 5) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING
- 6) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 7) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.
- 8) INSTALL D2856-400-710 ABRASION STRIP WITH A GAP ON BOTTOM SIDE OF CROSSTUBE, CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 9) TORQUE MS21920-20 CLAMPS 60 TO 80 IN-LB
- 10) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 11) ALL DIMENSIONS ARE IN INCHES
- 12) PART IS SYMMETRIC ABOUT CENTERLINE EXCEPT FOR $\varnothing 0.297$ HOLE.

UNDER REVIEW!07.02/16 *HA*CUT OFF
07.02.22

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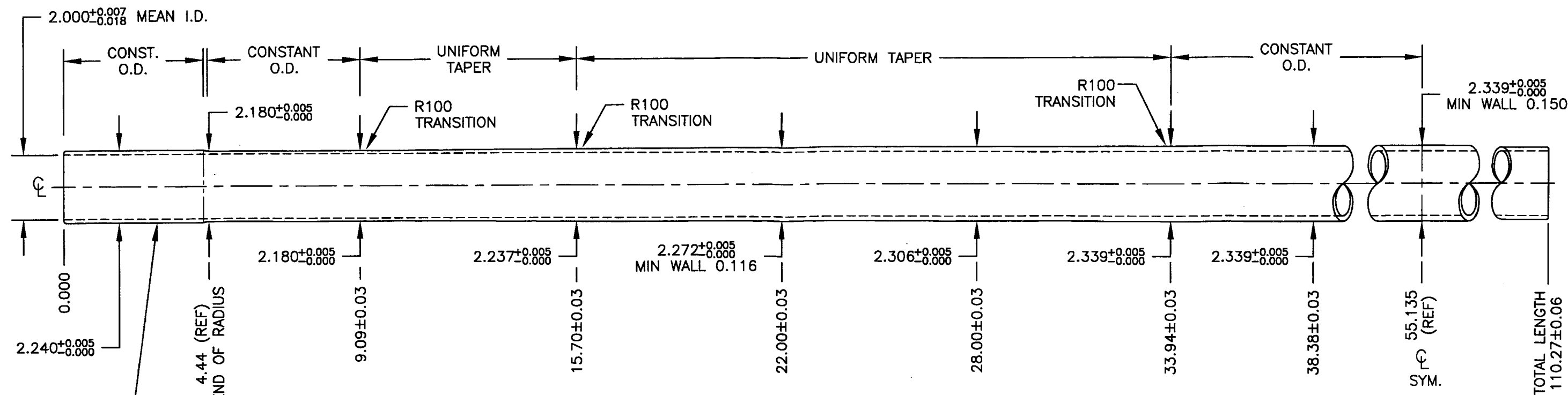
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06.10.31

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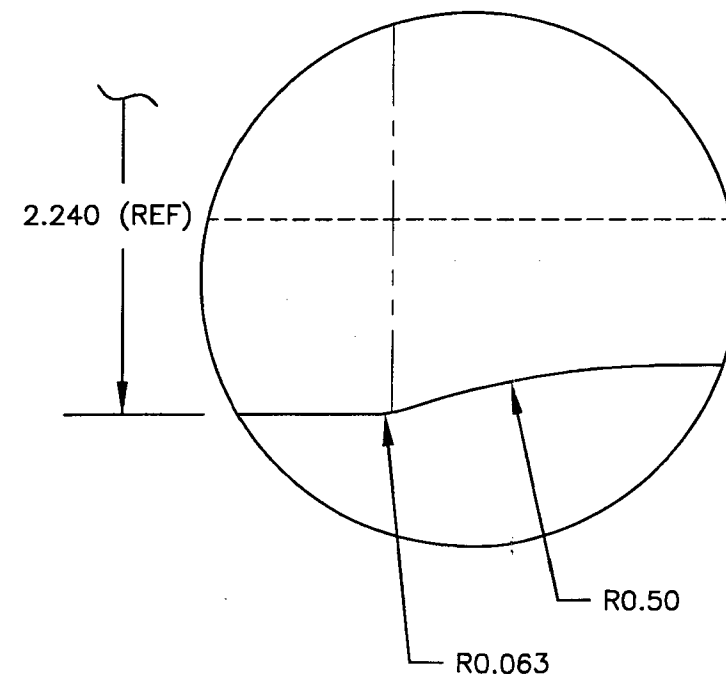
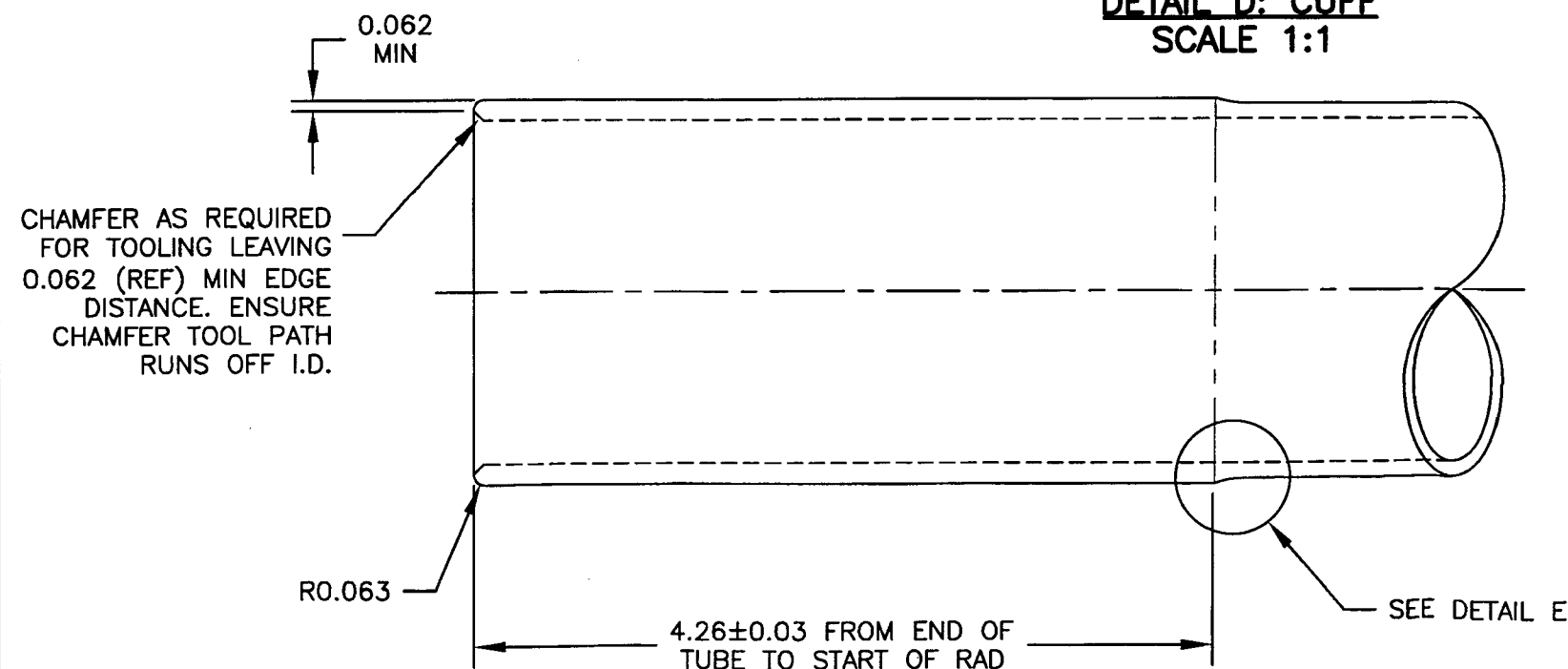
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| | | | |
|------------------|--|-----------------------------|--|
| DESIGN qp | DRAWN BY qp | DART | DART AEROSPACE LTD. HAWKESBURY, ONTARIO, CANADA |
| CHECKED H | APPROVED H | DRAWING NO. D350-748-141 | REV. D SHEET 2 OF 3 |
| DATE 06.10.31 | TITLE CROSSTUBE (AS 350/355 HI FWD) | SCALE 1:8 | |



D350-748-141 MACHINING DETAIL

DETAIL D: CUFF SCALE 1:1



DETAIL E: CUFF TRANSITION SCALE 9:1

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NO. 45380

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07.02/16/11
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OK 07.11.12

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06.10.31

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DESIGN

qp

DRAWN BY

qp

DART

DART AEROSPACE LTD.
HAWKESBURY, ONTARIO, CANADA

CHECKED

#

APPROVED

#

DRAWING NO.
D350-748-141

REV. D

DATE

06.10.31

TITLE

CROSSTUBE (AS 350/355 HI FWD)

SHEET 3 OF 3

SCALE

1:3

AC AERO

INTERNATIONAL INC.

RELEASE NOTE

GST No.: R105468102

OAK 107241-1



HEAD OFFICE
1371 SPEERS ROAD, OAKVILLE, ONTARIO
CANADA L6L 2X5
TEL: (905) 827-4171 FAX: (905) 827-7489



2009 WYECROFT ROAD, UNIT B
OAKVILLE, ONTARIO
CANADA L6L 6J4
TEL: (905) 827-7377 FAX: (905) 827-1380



QUEBEC DIVISION
7450 RUE VÉRITÉ STREET, ST. LAURENT, QUÉBEC
CANADA H4S 1C5
TEL: (514) 334-4240 FAX: (514) 334-6269

03/18/2009

MM/DD/YYYY

PAGE: 1

BILL TO: 1DAR01
DART AEROSPACE LTD.
1270 ABERDEEN ST.
HAWKESBURY, ON

SHIP TO: DART AEROSPACE LTD.
1270 ABERDEEN ST.
HAWKESBURY, ON

K6A 1K7

K6A 1K7

| DATE SHIPPED | SHIP VIA | F.O.B. |
|------------------|----------|-------------|
| 03/18/2009 | | |
| CUSTOMER P/O No. | JOB No. | ORIGIN |
| 8281 | | |
| | | TERMS |
| | | NET 30 DAYS |

| PART No. | DESCRIPTION | UOM | QTY ORD | QTY SHPD | TEST RESULTS |
|----------|---|-----|------------|-------------|--------------|
| D350-748 | -141,241 | EA | 12 | 12 | |
| | Process Specifications: | | | | |
| | HEAT TREATED TO 180 KSI MIN. PER AMS 2759-1D | | | | |
| | 100% HARDNESS CHECKED AS PER ASTM E-18 | | | | |
| | 40/45 HRC | | | | |
| | MATERIAL: 4130 | | | | |
| | S/N B45461, B45462, B45463, B45464, B45519, | | | | |
| | B45518, B45516, B45517, 8 PCS, -241 | | | | |
| | S/N B45366, B45367, B45380, B45381, 4 PCS, -141 | | | | |

100% HARDNESS TESTED

12 *ms*.

42/43 HRC

*Note: Parts are not
serialized.*



I hereby certify that the material covered by this release note has been inspected and tested and conforms to all specifications relevant thereto in accordance with the conditions of the contract / or purchase order.

ON BEHALF OF VAC AERO INTERNATIONAL INC.

Laura Robinson
Authorized Q.C. Inspector



HEAT
TREATING

VACUUM BRAZING - HEAT TREATING - SPECIAL PROCESSING - FURNACE EQUIPMENT
TURBINE COMPONENT OVERHAUL - PLASMA AND OTHER COATINGS

